

GEOMORPHIC CONTEXT FOR HISTORICAL DETERMINATION OF SEDIMENT SOURCES, TRANSPORT, AND DEPOSITION IN THE BAD RIVER WATERSHED, BAD RIVER RESERVATION, WISCONSIN

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Abstract: The Bad River in northern Wisconsin is thought to be the largest U.S. contributor of sediment to Lake Superior (19 percent of the suspended load). Previous studies have shown that the average suspended sediment load for the Bad River is 2.81 kg/ha/d or 1,030 kg/ha/yr. In 2001, a study was begun by the U.S. Geological Survey and Bad River Band of the Chippewa Tribe to better understand the major sediment source areas and historical geomorphic processes in the Bad River watershed related to erosion, transport, and deposition of sediment throughout the watershed. Initially, historical aerial photographs, maps, documents, low altitude video footage, and GIS overlays of watershed-scale thematic maps of land cover, surficial deposits, and bedrock geology were examined. Data gathered from these sources indicated that the majority of sediment and surface runoff originated from the lower half of the watershed. The upper half of the watershed is mainly forested, with a poorly developed drainage network developed on sandy and loamy surficial deposits. The lower part of the watershed has a mix of agriculture and forested land and a well-developed drainage network on clayey surficial deposits. In the lower half of the watershed, erosion is evident along approximately 150-ft high bluffs as the entrenched Bad River valley and tributary valleys intersect an early Holocene sandy glacial lake shoreline. Ridges of quartzite bedrock, mainly buried by surficial deposits, crop out along the lower main stems and act as intermediate base level controls, limiting any potential incision. Topographic surveys were done and cores collected along valley cross sections along the Bad River and its major tributary main stems in selected reaches dominated by erosion or deposition. Sandy historical overbank deposits along middle and lower main stems are about 7-10 feet thick, making the channels look entrenched even though little historical incision has occurred. At a USGS streamflow gaging station on the Bad River, the flood-plain sedimentation record is being compared to 80 years of flood record to determine overbank sedimentation rates in the context of climate and land cover changes. Total sediment load samples were collected at the gaging station in the spring of 2005 and data were compared to previous suspended sediment data and overbank deposition rates.